



User Manual



INFIELD7C

Handheld read-out device

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1 INFIELD7

1.1 Safety instructions and warnings

Electrical installations must comply with the safety and EMC requirements of the country in which the system is to be used.

Please note that any damages caused by handling errors are out of our control and therefore are not covered by guarantee.

Please pay attention to the following possible causes of risk:

- ❗ Do not open the housing of the INFIELD7.
- ❗ The INFIELD7 is splash water proof but should never be dipped into water or exposed to jet water.
- ❗ Do not run a not tempered INFIELD7 in a very warm or chilly surrounding. Always allow the device to adapt to the ambient temperature.
- ❗ Do not press or apply force on the display..
- ❗ Do not use sharp tools to operate the INFIELD7.
- ❗ Do not expose the device to direct sunlight.

1.2 Content of delivery

The delivery of a INFIELD includes:

- Carrying case
- INFIELD7 handheld measuring device
- Two protective caps for plug connectors
- This manual
- Laminated short instructions

1.3 Foreword

Measuring systems must be reliable and durable and should require a minimum of maintenance to achieve target-oriented results and keep the servicing low. Moreover, the success of any technical system is directly depending on a correct operation.

At the beginning of a measuring task or research project the target, all effective values and the surrounding conditions must be defined. This leads to the demands for the scientific and technical project management which describes all quality related processes and decides on the used methods, the technical and measurement tools, the verification of the results and the modelling.

The continuously optimized correlation of all segments and it's quality assurance are finally decisive for the success of a project.

So please do not hesitate to contact us for further support and information. We wish you good success with your projects.

Yours,

Georg von Unhold

1.4 Guarantee

UMS gives a guarantee of 12 months against defects in manufacture or materials used. The guarantee does not cover damage through misuse or inexpert servicing or circumstances beyond our control. The guarantee includes substitution or repair and package but excludes shipping expenses. Please contact UMS or our representative before returning equipment. Place of fulfilment is Munich, Gmunder Str. 37!

1.5 Durability

The nominal lifespan for outdoor usage is 10 years, but protection against UV-radiation and frost as well as proper and careful usage extends the lifespan.

1.6 Intended Use

The INFIELD7 handheld measuring device reads and stores measurements taken with UMS Tensiometers, but also supports certain other types of sensors.

1.7 Short instruction

This chapter is only a summary of following chapters. Please read the complete manual carefully before using the instrument.

To be used with the INFIELD7 sensors must be fitted with a male UMS-standard M12/IP67 plug, either with 4- or 8-pins.

Connect the sensor plug to the correct INFIELD plug and tighten the screwed coupling. Do not damage the screw by using force.

1. Plug in the Tensiometer. To start the INFIELD7 device press:



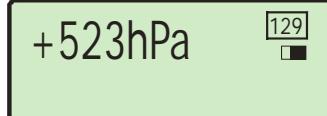
At the display appears:

WWW.UMS-MUC.DE

Press this key again shortly to switch the display light on and off.

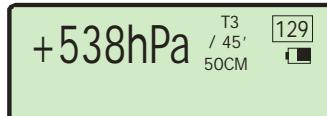
After the start up the Tensiometer measuring menu is entered directly. The INFIELD will recognize T8 and TS1 Tensiometers automatically.

2. The soil water tension now displayed is not compensated.



To activate the compensation of shaft length and installation angle, press the Escape key:

Pressing the ESC key again is deactivating the compensation



To set the compensation parameters, press one of the function keys F1, F2 and F3 to change the corresponding parameter in the display. Press each function key several times until the required setting is displayed.

Press F1 to select Tensiometer type (not with T8 or TS1 which are identified automatically)



Press F2 for setting installation angle in intervals of 5° deviation from horizontal (0°) to vertical (90°)



Press F3 for setting the shaft length (only T1, T3 and T5)



Now, the compensated soil water tension is displayed (plus soil temperature and serial no. with T8 and TS1).

The line on the right side of the display indicates the actual capacity of the internal batteries.



= batteries are discharged



= batteries have full capacity

3. To store the current reading press:
Maximum storage space is 220 readings.

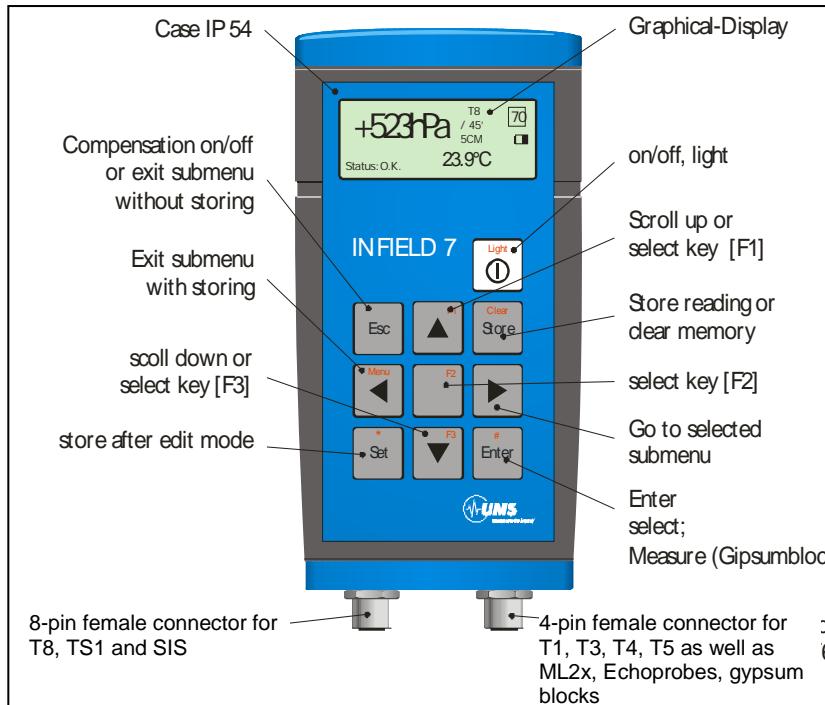


4. To switch off the INFIELD7 press the On/off key for at least 2 seconds:



2 Product description

2.1 Schematic view



2.2 Connections

The sensors will be only connected with M12 plugs to the female connector (4-pin: T1, T3, T4, T5, ML2x, EC-5; 8-pin: TS1, T8) of the INFIELD7.

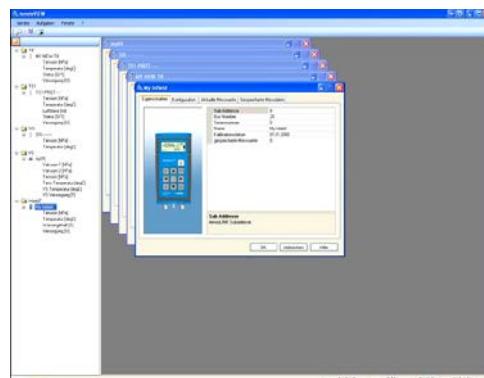
2.2.1 tensioLINK®

To use the serial interface the tensioLINK® USB converter with Windows software tensioVIEW® is required.

tensioLINK® is RS485 based and used for all functions, for taking online readings, for uploading stored data and for configuration of the INFIELD7.

2.3 Software tensioVIEW®

The Windows software tensioVIEW® (supplied with the tensioLINK USB converter) automatically detects all tensioLINK devices linked within a bus network. The software is used for the configuration of these devices and for displaying data.



3 Installation

3.1 Connecting sensors

To be used with the INFIELD7 probes must be fitted with a male UMS-standard M12/IP67 plug, either with 4- or 8-pins.

Connect the sensor plug to the correct INFIELD7 plug and tighten the screwed coupling. Do not damage the screw by using force.

T8 and TS1 Tensiometers are connected to the 8-pin connector, other Tensiometers and sensors to the 4-pin connector.

⚠ After taking readings always cover the sensor and the INFIELD7 plugs with the protective caps.

3.2 Batteries

The INFIELD7 can be powered with two types of replaceable alkaline batteries. You can either use 4 AA Mignon batteries (LR6, 1.5V) or one 9V E-block (6LR61). The 9V E-block is inserted in the lower part of the battery compartment.

Select the used battery type in the configuration menu for the correct display of the capacity indicator.

Press F1 to switch:



- ⚠ If the wrong type is selected the unit might switch off abruptly.
⚠ We recommend using 4 AA Mignon alkaline batteries as then the time of operation is significantly longer.

4 Operation

4.1 Basic operation of INFIELD7

4.1.1 On-off switch

To start the INFIELD press:



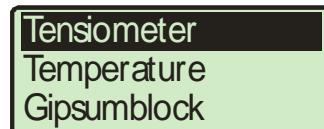
After the start up the Tensiometer measuring menu is always entered directly. To switch off the INFIELD7 press the same key for at least 2 seconds.

INFO It takes approximately 3 seconds before the INFIELD7 can be restarted again.

4.1.2 Navigation

Simply follow the menus to operate the INFIELD7.

To go to the main menu press the menu key:



Select an option menu or a function with the scroll keys (up or down):



To enter the selected option menu press:



To return to the main menu and save all options selected in the option menu press:



To return without storing changes, press the Escape key:



4.2 Configuration

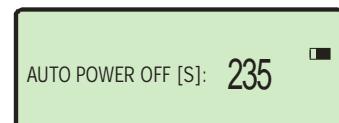
To return to the configuration menu you have to

4.2.1 Automatic Power down

(Configuration/Timeout)

If the timeout function is activated, the INFIELD will power down automatically if no key is pressed within the adjusted period of time (20 ... 254s).

Select Timeout in the configuration menu to enter the timeout menu:
(Configuration/Timeout)



Press the up and down keys to set the required time (in seconds).

Hold the key for fast scrolling



To de-activate the timeout mode, press the F1 (up) key several times to scroll up to 254 seconds. Press F1 once again to select OFF.



TIP The selected time should not be too short to give you enough time to pick up and store the readings.

4.2.2 Display light

To light up the display press:

To turn off the display light press the key again.

The light will always be turned off after 60 seconds to save energy.

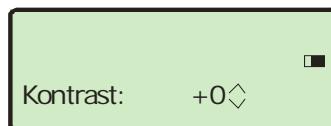


4.2.3 Display contrast

(Configuration/Contrast)

With the up and down key select the contrast in intervals from

-5 ... 0 ...+5.



Press the Menu key to return and store the setting.



4.2.4 Battery capacity / Charge conditions

When you are in a submenu, the line on the right edge of the display indicates the actual capacity of the batteries:



=Batteries empty, need to be replaced



= full capacity

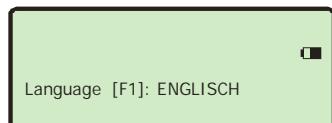
Operation

With four new and full batteries of type Mignon AA Alkaline the Infield can be operated for approximately 40 hours (when the display light is not used). The indication line drops linear but might vary with different ambient conditions like temperature. It is only an indication of the capacity.

4.2.5 Menu language

(Configuration/Language)

To switch the language select Language (Sprachenwahl) in the configuration menu. In the language set-up menu,



Press F1 to switch between German and English.



Press the Menu key to return and store the setting.

4.2.6 System time

(Configuration/System time)

To stamp readings with the correct time, the INFIELD7 clock has to be set. Then, uploaded readings include the time of the measurement.

INFO The measurement times can only be viewed in the tensioLINK software. For uploading readings the tensioLINK USB converter is required.

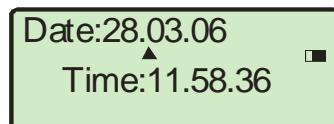
If the INFIELD7 clock has not been set, no time is displayed:



To enter date (dd.mm.yy) and time (hh.mm.ss) press:



You will get:



The arrow marks the selected value. To change this value press:



To select the next value which you want to change press:



To save the settings, press:



4.3 Store, view and clear the current reading

4.3.1 Storing the actual value

Any time a reading from any probe type is displayed in a measuring menu, it can be stored by pressing the Store key:



Then, the current reading is stored with its index number, the probe type and, if relevant, with further indices.

The index number starts with 1 and goes up to 220, which is the maximum storage space. After storing a reading, the index number for the next reading stored is shown in the box next to the battery charge line:

The next reading is stored with this index number 129.

129

If the memory is full, no further readings can be stored and the index shows "-". With the tensioVIEW® software this configuration can be changed so the last reading will be deleted and replaced by a new reading.

4.3.2 View readings

Select Stored Data in the main menu. All stored readings are listed with their index number.

If no data is stored, the following is displayed for a few seconds:

NO DATA IN MEMORY !

Scroll the list with the up and down keys:



You will get for example:

5: T8-554,+360HPA,23.4°C
6: E-10,36%V
7: E-20,45%V
8: T4,+450HPA

Please note:

4.3.3 Clear memory

Only the complete data set can be deleted.

To clear the memory press Clear for at least 3 seconds.

A call back is displayed to confirm the deletion.

Confirm "Yes" by pressing Enter



 Deleted readings cannot be restored!

4.4 Tensiometer measurements

When the INFIELD is switched on, the start-up menu always is the measuring menu for Tensiometers. The current soil water tension is displayed directly if a Tensiometer is connected.

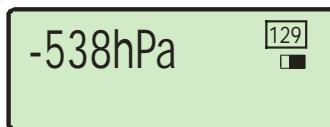
There are two optional modes for readings:

- Without compensation the pressure sensor's output signal is displayed unchanged.
- With compensation the water column inside the Tensiometer's cup and shaft is corrected, as the water column additionally pulls on the pressure transducer causing an offset shift. Only the vertical share of the water column - depending on the installation angle - is calculated and withdrawn from the actual pressure signal. The parameters Tensiometer type, installation angle and shaft length have to be set correctly before.

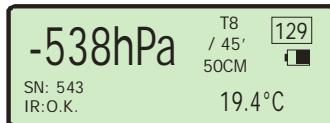
To switch between both modes press the Esc key:



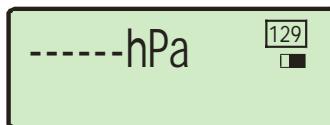
Without compensation the pressure sensor's output signal is displayed unchanged:



With T8 or TS1 Tensiometers serial number (stored inside the Tensiometer), soil temperature and filling status are displayed as well.



If no Tensiometer is plugged on, the display looks like:



- ⚠ Signal definition of Tensiometers: Tensiometers measure soil water tensions (suction forces), which are negative pressures. Therefore, tension readings of Tensiometers should have a negative sign. In reverse, if soils are saturated and the Tensiometer is below a water level, the readings should have a positive sign (pressure of water).
- ⚠ UMS refers to this ISO units conforming definition since 1st January 2006. Infield firmware of version 3.x or higher consider this definition.

4.4.1 Set the compensation parameters

The compensation is only done correctly when the proper Tensiometer parameters (type, shaft length and installation angle) have been entered.

Press the proper key until the required value is shown.

The offset for T4 and T8 Tensiometers is only little. Therefore, the only selectable offset is 5 cm.

Tensiometer type:

T8 or TS1 are identified automatically (if the Tensiometer is plugged in) but for other Tensiometer types press the F1 key several times to select the Tensiometer type.



Installation angle:

Required for all Tensiometer types. Press the F2 key to scroll from 0° to 90° in intervals of 5°. Select 90° for vertical and 0° for horizontal installation. (With horizontal installation no water column affects the reading.)



Shaft length:

Selectable only for Tensiometers T1, T3 and T5 as the shaft length influences their readings. Press F3 to select the correct shaft length.

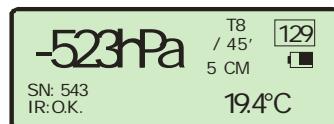


Tensiometer	Selectable Range	Interval
T1 / T3	5...200 cm	10 cm
T5	5...30 cm	5 cm
T4 / T6 / T8	5 cm	none

For example T3:



For example T8:



4.5 Temperature measurements

The INFIELD7 supports the UMS Thermistor temperature probe Th2. PT1000 are compatible, but their accuracy is reduced. To enter the temperature menu select Temperature in the main menu.

- ⚠ Disconnect any sensor from the meter. Do not connect the temperature probe before selecting the probe type in the temperature measuring menu. Otherwise, the sensor might be damaged.

Please enter Temperature before you connect the 4-pin plug to the INFIELD7



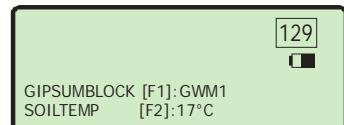
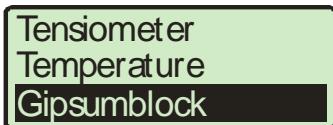
In the temperature measuring menu press F1 to select the probe type:

The temperature reading is displayed.



4.6 Take readings with gypsum blocks

The INFIELD7 can measure the resistance respectively the conductivity of Watermark (GWM1) and Soilmoisture G-blocks (GSEC). Go to the gypsum block measuring menu:



Either the unprocessed reading of the resistance [Ohm] can be displayed, or, depending on the gypsum block type, the soil water tension in hPa.

Press F1 to switch between the gypsum block types.



Temperature compensation: A soil temperature value (which needs to be estimated or measured separately)



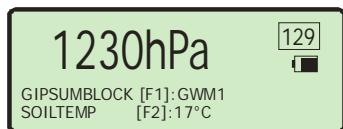
should be selected for compensation of the gypsum block reading. Press F2 repeatedly until the correct temperature is shown.

- ⚠ Always enter the soil temperature before taking a reading, as the gypsum block conductivity strongly depends on temperature. If you want to store not compensated readings for a later manual evaluation, select the setting of 18°C.
- ⚠ Other than the other measurement modes the gypsum block readings are not executed automatically.

After type and temperature have been selected, press the Enter button to start a reading:



After a few seconds, the value is displayed:



Press the Store key to store the reading.
For the next measurement, press Enter again.

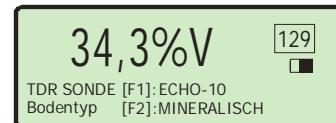


Note that the highly resolved, unprocessed value of consecutive readings will show a drift. This effect is caused by the used measuring technique, but is small compared to the accuracy of gypsum blocks. Preferably, take only one reading at a time.

INFO For gypsum block measurements, the INFIELD7 uses a specially designed procedure which excludes falsifying influences like the gypsum block capacity, resulting in a higher accuracy and better accordance between different blocks. A correlation of readings with the INFIELD7 and other data acquisition systems, like data loggers, is not always possible. It is advisable to use only one type of measuring system for series of measurements or calibration.

4.7 Take readings with TDR/FD probes

The INFIELD7 can take readings with ML2x/Thetaprobes, SM200 probes and Echoprobes EC-5, EC-10 and EC-20 to measure the volumetric soil water content. These sensors have to be fitted with the UMS standard 4-pin pug M12/IP67.



Press F1 to switch between the probe types or the unprocessed voltage signal:



If [VOLT] is selected, the value shown is the currently measured unprocessed voltage signal, unit [mV]. Select ECHO-5, ECHO-10 or ECHO-20 for Echoprobes, THETA P for Thetaprobes, type ML2x or SM200. For these probes, the volumetric soil water content is measured in [%vol].

Soil type: Press F2 to switch between two calibration curves for mineral or organic soils:



INFO When taking readings of the volumetric soil water content the influence of the soil structure must be considered. For mixed soils or individual calibration curves, use the unprocessed voltage value [mV].

5 Software

5.1 Work with tensioVIEW

5.1.1 Menu

tensioVIEW has a simple menu for mostly self-explaining read-out and configuration of tensioLINK devices.

After starting tensioVIEW the display is more or less blank, most functions are inactivated.

Search devices

 If one or more sensors are connected via the USB-converter they can be searched by pressing the “magnifier” button.

tensioVIEW offers two options for searching:

Single device mode

 tensioVIEW expects that only one device is connected which will be found very quick. This mode is not functional if more than one device is connected!

Multiplex device modes

 tensioVIEW is able to detect up to 32 devices connected to the bus within 8 seconds, but only if each device is already personalized with an individual bus identification address. If two or more devices have an identical address, none of them will be found.

All devices found will be displayed in the left section as a directory tree. Same types of devices will be grouped in one directory.

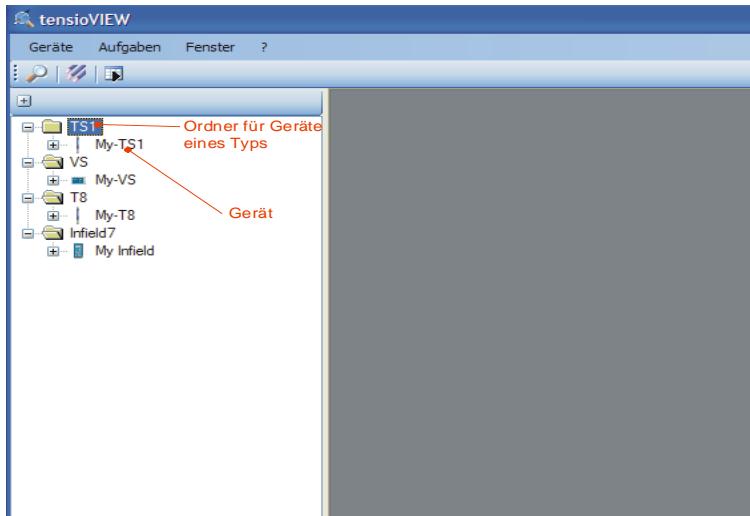


Fig. 4.1: Found devices in tensioVIEW

Detected devices will be displayed with their programmed names. Press the + symbol to see what readings the device can offer. Double-click on the name to open a menu window where all specifications and functions of this device are displayed. Depending on the type different registries are available. The first shows an overview of the current settings and information about address number or error messages.

5.1.2 Configuration of a device

Select the register "Configuration" for viewing and changing the programmed settings of the device.

Depending on the authorization status, only parameters that can be edited are shown. To store it in the device, a changed parameter has to be sent to the device by pressing the "Upload" button. A message notifying about the successful configuration will be displayed.

Configuration changes are effective immediately.

5.1.3 Current readings

Enter the interval and click on "Start" to display the current readings.

5.1.4 Stored readings

Click on "Download" to display stored readings. In the next step you can download readings to your PC in CSV format.

5.2 Configuration settings for T8

Those settings which are editable only for *Power* users are marked with an asterisk *.

Parameters with related functions are bundled in one folder.

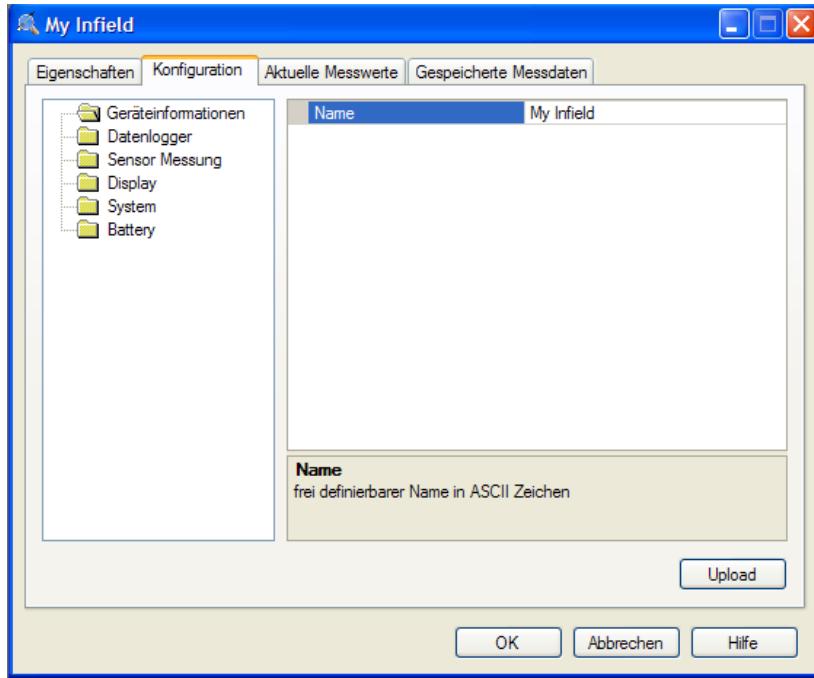


Figure 4.2: tensioLINK®

Device information

Device name

Individually editable name of the Tensiometer in ASCII. Maximum length 12 digits

Data logger

Interval

Logging interval of the internal logger

Ring buffer memory

With ring buffer activated the oldest readings are overwritten when the memory space is full.

Sensor Readings

External Tensiometer Type

Which Tensiometer type is measured with INFIELD7

Display

Display language

Choose English or German

Display contrast

Values between 0 und 10

Display light timeout

Display background illumination will be switched off after time settings

Display start function

Tensiometer (preinstalled), more functions: TDR, temperature, gypsum block

Display Mainfunction Timer

System

Power save mode

Time until „auto off“ in sec.

If you select 255 sec „auto off“- is out of function. The display is always on

System

Battery Type

4 x AA Alkaline

4 x AA NMH

1 x 9 V Alkaline

6 Cleaning and maintenance

We recommend using 4 AA Mignon alkaline batteries as then the time of operation is significantly longer.

6.1 Cleaning

To clean the housing, wipe off the housing only with a clean and moist cloth. For best results use pure water with a drop of washing-up liquid.

6.2 Maintenance

The device should be returned to UMS after two years for check up and recalibration.

7 Extended functions

7.1 T8 Calibration

(Configuration/T8 calibration)

Please contact us to receive calibration instructions!

The INFIELD7 can be used to recalibrate the pressure transducer, the temperature probe and the IR-indicator signal of T8 Tensiometers. The T8 is programmed via a serial bus. Calibration values are stored permanently.

Calibration tools for establishing a reference pressure are required. A calibration kit is available as an accessory. Please ask for detailed calibration instructions before calibrating Tensiometers.

 Attention: With the calibration function, the data stored inside the T8 is changed permanently. When changed wrong, the calibration data can only be reset to the initial status, and any calibration data changed in the meantime is lost. Please only use the calibration function when the process is clear to you. A reset of the temperature offset should only be done in an exceptional case.

8 Trouble Shooting

Problem	Solution
When switched on the INFIELD7 displays the welcome message www.ums-muc.de but then shuts off.	Possible cause: Empty batteries. → Replace the batteries
The unit does not respond at all.	Remove the batteries. Wait for at least 5 minutes before inserting the batteries again.
Display is hard to read (poor contrast)	Possible cause: The ambient temperature is low. → Increase the contrast setting.
The display is almost black.	Possible cause: unit is exposed to direct sunlight. → Take the unit out of the sun and let it cool down.
Series spring 2008 Device might not shut off even if timeout is set to 120 seconds.	Bug fixed in firmware Ver.4.3 Upload the latest firmware using tensioVIEW software
Display light will switch off only after one minute.	Change the setting using tensioVIEW. Nevertheless, the display light requires only little power.
Readings are displayed in capital letters	Cannot be changed due to the selected small digit size. Display for example „200 HPA“
Series spring 2008 T8 with wrong prefix during overpressure	T8 firmware problem . Upload he latest firmware to the T8.

9 Appendix

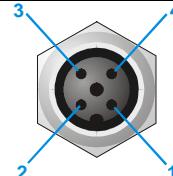
9.1 Technical specifications

Tensiometer		
T1...T5	Measuring range	-250 kPa...+250 kPa
	Resolution/Accuracy	0.1 kPa (0.01 hPa) / 0.1 kPa
T8	Measuring range	-100 kPa...+250 kPa
	Resolution/Accuracy	0.1 kPa (0.01 hPa) / 0.05 kPa
TS1/T8-2005 (serial)	Measuring range	-250 kPa...+250 kPa
	Resolution/Accuracy	0.1 kPa (0.01 hPa) / 0.1 kPa
TDR/FD		
Voltage	Measuring range	0....2500 mV
TDR/FD	Measuring range	0...100 %VWC
Temperature		
Ohm	Measuring range	0...80 kΩ
Temp (Th2)	Measuring range	-30...70°C
	Resolution/Accuracy	0,1°C / 0,5°C
Temp (PT1000)	Measuring range	-30...70°C
	Resolution/Accuracy	0,2°C / 1,5°C
Gypsum bloc		
Resistance (Measuring range	0...70 kΩ
GSEC1	Measuring range	100...1000 hPa
GWM1	Measuring range	200...2000 hPa
Display		
	Graphical	120x32 Pixel
Power supply		
Battery		4 x AA or 1 x 9V
Time of operation	During measurement	40 h light off / 8 h light

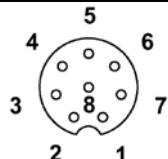
	with 4 x AA	on
Memory		
		220 Readings with date
housing		
Size		9 x 18 x 3 cm
Material		ABS, keypad PE
Protection category		IP54
Operating temperature		
		0...40°C

9.2 Connections and wiring

Standard connection, Tensiometer Type T1...T5 M12-4 wire cable, right			
Signal	Pin	Wire	
V+	1	brown	
S+	2	white	
V -	3	blue	
S -	4	black	

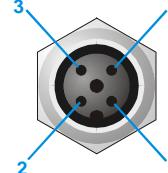


Standard connection, Tensiometer Type T8 M12-8 wire cable, left				
Signal	Pin	Wire	Function	
V+	1	white	6...20VDC	
GND	2	brown	GND	
Out1	3	green	Stand: pressure	
S-	4	yellow	Signal-	
dOut	5	grey	Status	
A	6	pink	RS485-A/I2C	
B	7	blue	RS485-B/ I2C	
Out2	8	Red	Stand: temp	

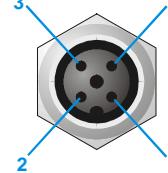


Standard connection, temperature M12-4 wire cable, right

Signal	Pin	Wire	
V+	1	brown	
S+	2	white	
V -	3	blue	
S -	4	black	

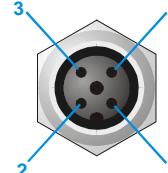
**Standard connection, FD-probes (ML2x, Echo) M12-4 wire cable, right**

Signal	Pin	Wire	
V+	1	brown	
S+	2	white	
V -	3	blue	
S -	4	Black	

**Standard connection, gypsum block wire cable, right**

The pigtail ends are connected in the plug

Signal	Pin	Wire	
V+	1	brown	
S+	2	white	
V -	3	blue	
S -	4	Black	



9.3 Accessories

Item	Art. no.
tensiolINK junction box with 6 inputs for e.g. T8, TS1 or SIS-C8 sensors	tL-8/X6
Adapter cable for connecting the tL-8/USB to a junction box tL-8/X6 or a T-piece plug	tL-8-4/5
tensiolINK USB converter for configuration or data readout of T8-2005, TS1, SISC8, VS vacuum stations, Infield7 via PC or laptop USB port, sensor power supply from USB port, incl. Windows PC software tensioVIEW	tL-8/USB



9.4 Units for soil water and matrix potentials

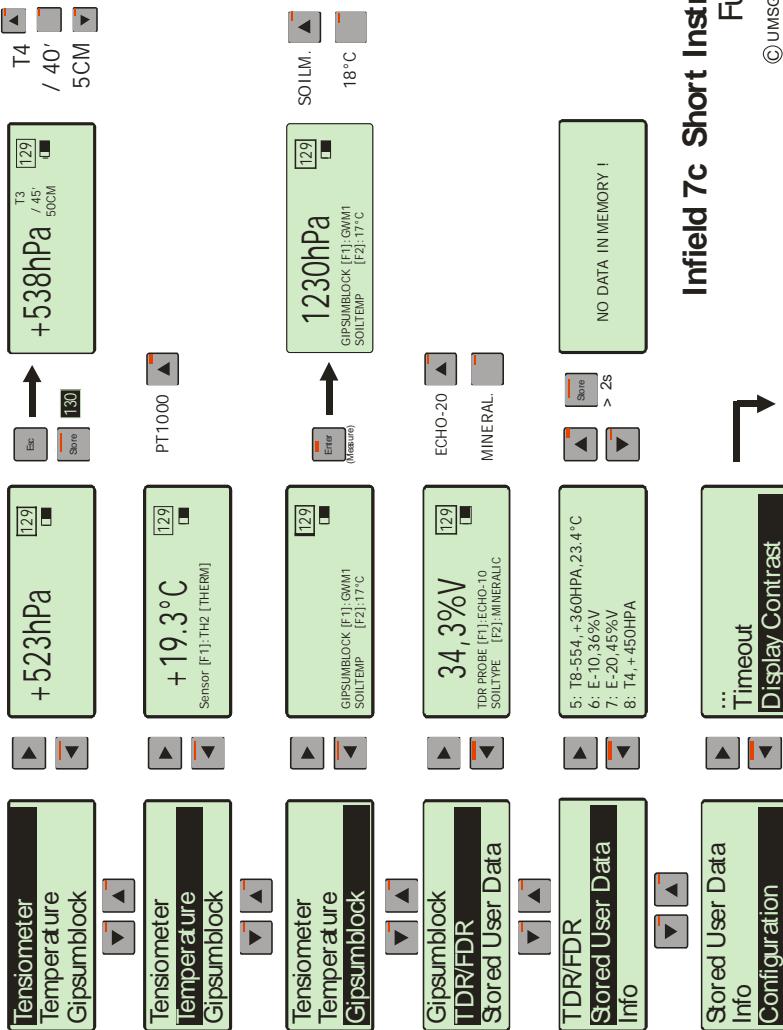
	pF	hPa	kPa=J/kg	Mpa	bar	psi	%rF
	1	-10	-1	-0,001	-0,01	-0,1450	99,9993
	2,01	-100	-10	-0,01	-0,1	-1,4504	99,9926
FK field capacity	2.53	-330	-33	-0,033	-0,33	-4,9145	99,9756
Tensiometer ranges*	2.93	-851	-85,1	-0,085	-0,85	-12,345	
	3	-1.000	-100	-0,1	-1	-14,504	99,9261
	4	-10.000	-1.000	-1	-10	-145,04	99,2638
Permanent wilting point	4.18	-15.136	-1.513	-1.5	-15	-219,52	98,8977
	5	-100.000	-10.000	-10	-1 00	-1.450,4	92,8772
Air-dry**	6	-1.000.000	-100.000	-100	-1 000	-14.504	47,7632
Oven-dry	7	-10.000.000	-1.000.000	-1.000	-10 000	-145.038	0,0618

* standard measuring range of Tensiometers

** depends on air humidity

Note: 1 kPa corresponds to 9,81 cm water column

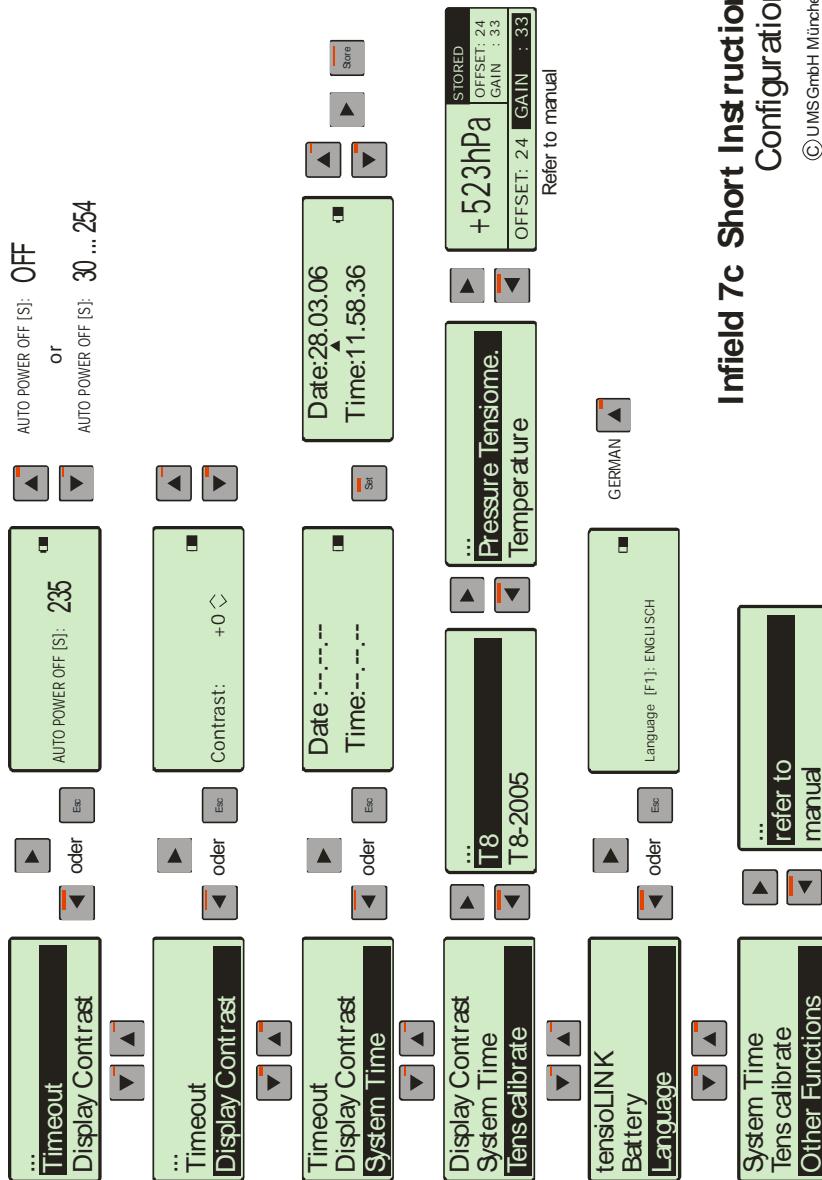
9.5 GraphicalOverview



Infield 7c Short Instruction Functions

Functions

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Your addressee at UMS

Sales Georg v. Unold Tel:+49-89-126652-15
Email: gvu@ums-muc.de

About this manual Thomas Keller Tel:+49-89-126652-19
Email: tk@ums-muc.de



UMS GmbH
D-81379 München
Gmunderstr. 37
email: info@ums-muc.de

Ph.: +49-89-126652-0
Fax: +49-89-126652-20



Strictly observe rules for disposal of equipment

containing electronics.

Within the EU: disposal through municipal waste
prohibited - return electronic parts back to UMS.

Rücknahme nach Elektro G
WEEE-Reg.-Nr. DE 69093488